

**SUBTECH Keynote Speech  
Dec 16, 2004  
VADM Chuck Munns**

**Thank you Steve for your kind introduction. Welcome to all the members of the Undersea Enterprise. I am glad you took the time to attend this off-site. Special thanks to Mr. Glenn Zora and Joe Hellner who put together a superb program, which should leave all of us more informed and better synchronized. It truly is a pleasure for me to be here and today I hope to engage in some very frank conversation, which will help to guide all of us into the future.**

**As I look to the future and the challenges we face in keeping the submarine force ready and relevant, I am reminded of a challenge faced by a fellow submariner more than 62 years ago. On 27 May 1942, USS YORKTOWN returned to Naval Station Pearl Harbor for repairs to significant damage sustained during the Battle of Coral Sea. Conservative estimates placed the time for repair at no less than three months. Admiral Nimitz, who was well aware of the**

Japanese advances toward Midway, desperately needed the capabilities YORKTOWN, a proven Fleet carrier, would bring to the upcoming fight, and simply could not afford to lose her. He compressed the three month yard period to three days. The workforce at Naval Shipyard Pearl turned-to magnificently, dedicating 1400 workers night and day. To ensure sufficient electrical power to the yard throughout the timeframe, the entire island of Oahu sustained sequential black-outs. These extraordinary efforts ensured YORKTOWN sailed from Pearl Harbor on 30 May a battle ready asset, and into history.

It is my honor and privilege to be serving as Commander Naval Submarine Forces. We, like those supporting YORKTOWN, have an urgent mission. We are being called to fight the Global War on Terrorists. Like Nimitz, we need improved capability, which will give us more of an advantage in this war and because the enemy is pressing, we need it NOW. But unlike Nimitz, we don't have the luxury of

**redirecting virtually unlimited assets at our challenges – we operate in an environment of fiscal constraint simply unknown to our predecessors. We can, however, do this... it's the right thing to do... it is possible... we can meet the Nation's needs with a creative mixture of innovation, technical excellence, intelligent investment, and responsible resource management.**

**Just look at our success this past year. Our globally deployable force is contributing to operations in every theater. Today, 11 submarines are deployed and another 24 ready to surge if needed. We sent them forward by every possible route: under the Arctic, around the Capes, and through the major canals. This flexibility and responsiveness is a tribute to the capability and training investment we have made in the past. And we are continuing to invest. USS VIRGINIA, the first of our new class of attack submarines designed for the post-Cold War environment, has been commissioned, PCU JIMMY CARTER has successfully**

**completed sea trials, USS OHIO is back in the water progressing toward completion of her conversion to SSGN, and we have solid new construction and modernization efforts underway.**

**To ensure continued success, we must collectively work a tight process, which provides solid, efficient results. That's what we are really here to do today: synchronize and focus our already established SUBTECH process. So today I will talk about our SUBTECH process a bit and then highlight some focus areas, namely: decision making, analysis, interoperability, expanding our area of regard, and cost-wise technology insertion.**

**It is a great time in our history for SUBTECH, because we are at a crossroads. Technology has reached the point of enabling the submarine crew to expand their area of regard and, at the same time, become a much more connected and collaborative participant of the Joint Force. Each submarine**

is, and eventually each sensor and weapon will be, a node in the force-wide network.

There is much to do. I believe our formula for continued success is the effective, timely and efficient output of a finely tuned system of people, processes and equipment. During my tour as Commander, Submarine Group Eight, I had the opportunity to ride many foreign and U.S. submarines. And I will tell you we are truly blessed. We have the best equipment, the best support, and the most motivated, professional, and innovative sailors on earth. But I also noted a few areas where there wasn't much difference in output between what our subs were doing and the other benchmarks. To stay ahead, we need to continuously improve the intersection of people, processes and equipment, and the second of these three – process – holds the potential for quickest and most significant improvement. The people and equipment are already there, and it's the processes that tie them together.

**Gathered here today are people who can make a difference – YOU. You together can work that synergy of people, process and equipment. In the audience you will find:**

- Our leadership from the Secretary of the Navy's and CNO's staffs**
- Industry**
- University Research Centers**
- Government Research Labs**
- Warfare Centers**
- Program Offices**
- System Commands**
- Strategic Systems Programs**
- Resource Sponsors, and**
- The Fleet**

**SUBTECH was formed to establish communication and intersection paths to keep Submarine Force needs synchronized with the evolution of technology. We have a responsibility to fulfill this charter. Some of you bring technology into submarines and their subsystems. Some of you, the Fleet, recruits and trains the people and equips and maintains the boats. Together we create a smooth, efficient, repeatable, and connectable process which delivers world-class undersea capability. The structure we have established**

**is simple and it is aligned with Sea Power 21, the Future Capability Vision, and the Naval Capabilities Development Process. The structure is in place, we merely have to effectively use it.**

**Let's start with some attributes we must all jealously guard: stealth, agility, mobility, and war winning capability. We, to date, have built, integrated, and executed these attributes to make undersea warfare more relevant than ever. Our ships and crews provide unique value, particularly in forward areas during the pre-hostilities phase of combat and we are equal partners in the other phases.**

**We clearly have the best components of superiority – people and equipment – but if other nations meld these same components into a better system, then they can approach our performance. Said another way – if we don't mold these into the best, most coherent system then we are not making best use of the resources our great nation has loaned to us, and we put our people and our Nation at RISK.**

**Let me provide a bit of background which supports SUBTECH effort. We have a good system in place to analyze, articulate, and prioritize requirements. If you haven't already, you need to read the "Submarine Force Future Capabilities Vision", which is posted on the SUBLANT homepage. By the way, this speech is also posted there. Everything I tell you today is consistent with the Future Capability Vision.**

**To summarize, there are four strategic concepts:**

- **Assure access**
- **Develop and share knowledge**
- **Strike rapidly, with surprise**
- **And, dissuade and deter**

**These drive 5 technology vectors:**

- **Payload**
- **Modularity**
- **Connectivity**
- **Computing and automation**
- **And, integrated electrical systems**

**The vision provides Sea Power 21 capabilities to pursue on a priority basis. You should, as I do, refer to these when making resource decisions.**



**In addition, to assure alignment throughout the Force, we also have a robust bottom-up approach to requirement generation, which utilizes the Submarine Tactical Requirements Group to capture shortfalls and recommend improvements to tactical systems. They rely heavily on an ability to upgrade these systems through the APB process inherent now in our weapons control, communications, electronic surveillance, and torpedo systems.**

**To formalize the process, we have developed systems to maintain history, vet new ideas, and prioritize expenditures of limited resources. The “Cost of Doing Business” matrix tracks the fixed requirements associated with running our submarine force. The “Minimum Modernization Matrix” captures the process of maintaining our submarines and systems up to date and responsive to needs of the fleet. And the “Future Capability Matrix” helps guide our investment decisions to buy new capability. You have access to all of**

these on the SIPRNET through the N8 section of the  
SUBLANT web site. Now on to the meat of the discussion...

I'll discuss five outputs we want from our systems.

There are more than five but these are a good place to start.

Others will talk about payload, UUV, ARCI, APB... let me  
rather turn to output characteristics. How do we tune our  
system of people, process, and equipment. I will start from  
inside the hull and work my way out. I'll discuss:

- Decision making
- Analysis
- Interoperability
- An expanded area of regard
- Cost-wise technology insertion

First, decision making. Throughout my career I have  
observed as computing power increases, that in a relative  
sense distilled, relevant, and intuitive information presented  
to the decision maker has diminished. I am about to carbon  
date myself, but all of you have access to my bio. Let me take  
you back to my first Fire Control system, the Mark 101 Attack

**Director. Although limited in its versatility, it formed a tight system with the decision maker. The Commanding Officer could look over at the simple analog dials and without having to assimilate and integrate in his head, he was provided the knowledge he needed to make decisions and take actions. These dials presented in an intuitive way the information that was needed. When you don't know much, it's not too hard to clearly present it. Today, as we sense so much more, we have built many tools. Most of these are focused on the technician as they work to process data. But we have missed the opportunity to develop commensurate improvements in data fusion, display and decision making. The decision makers are increasingly less connected to the system and are forced to spend substantial cognitive effort processing and integrating data – stealing precious time needed for strategic planning and operational analysis. I have seen a recent trend reversal with emphasis on fusing data and presenting it in a format more conducive to decision making. We have long**

since gone digital, we have written a number of fancy tracking algorithms, we have even implemented tools, such as the Parameter Evaluation Plot, or PEP, which help the operators and decision makers gauge the accuracy of generated solutions. But we must do more. Available sensor and environmental data is only going to grow, so we need to get out and stay in front of this power curve. We shouldn't require several dozen people jammed into a full control room to assist the single decision maker – the approach officer. We need to do better.

There is more to the story than just the way information is presented. We must also consider the viscosity of information flow. The Commanding Officer can't make a decision on information trapped in a Department Head's inbox, or displayed only on the fire control operator's hidden screen. Conversely, a decision maker swamped with information flowing unimpeded to him is worse off than if none of it had come his way. The great crews I've seen –

**whether conducting navigation, weapons employment or engineering drills – all have a low viscosity of information flow. The right information gets to the right people at the right time so they can make the right decisions. There are several reasons this might not happen, all of which we need to address. First, we need to have the right information. The problem here is not all information is equal, accessible, or even of constant importance. As an example, the Navy's Distance Support program and the Submarine Force's Technical Data Knowledge Management program together are working on accessing information from off hull and dynamically updating information stores such as tech manuals. However, no system is in the works that finds, validates, and makes this and other information easily accessible to the crew once it's on board. We need an efficient search, retrieval, and "new posting" mechanism. Then, the right person needs to have this information at the right time. Here is where viscosity of information plays a**

large role. Another example – maybe a bit dated but it's one we can all relate to. Consider the information flow from the sensor to the Approach Officer when we were using manual plots. Sonar would detect a contact, put a tracker on the noise level (3-4 people), we then align a repeater to the tracker, read out loud the bearing at 15 sec intervals, plot it on a chart to give us an average over a minute (2-3 people), plot this on a separate geographic chart, do some analysis and then pass the result to the Fire Control Coordinator (4-5 people). He would compare this solution to other algorithms, insert a system solution which drove weapon presets and finally assisted the approach officer with ship placement and weapons launch decisions and action. A total of several dozen people and five to fifteen minutes of time. This was a highly viscous information system. What happens when the bearing jumps 4 degrees in 10 secs – does the CO see it on his own, does sonar report, does time bearing recorder or plot report, does plot coordinator speak up, does FCC recognize

the close contact? The good news is that we, by and large, have improved and moved past this particular viscous process but you get my point - there is more to be gained here and many other processes to improve. We need low information viscosity in all our processes – navigation, contact coordination, environmental sensing, sailor training, equipment maintenance, engineering drills, etc. So here is your challenge: design systems which present relevant information from sensor or historical data, which do so quickly and intuitively and which require fewer technicians. Then help us to drastically streamline the process which that info supports.

Second, Analysis. Now that we have the right information flowing to the right people at the right time and in the best format, we need to conduct analysis. I break this down into strategic and tactical. Strategic analysis is conducted across the force to trend matters like our torpedo proficiency, navigation practices, and tracking expertise. It's

being done by NUWC, DEVRON-12 and others. We are doing well but need to do more. Let me discuss tactical analysis here. So often, during the heat of standing watch, we either miss an important piece of data, don't recognize its closeness to a red line or trip wire or fail to note a worsening trend. And even more critical, when we do see and learn, we fail to advise the other watch teams, or other ships, which means they are doomed to relearn the same lesson. To illustrate, imagine you're a watch team transiting along a coast – it's much more than maintaining your track on a chart and assigning contact numbers as you progress through the area. Rather, you must collect information from multiple sources: spherical, hull, wide aperture, and towed arrays, radar, fathometer, ESM, radio, sound velocity profilers, acoustic intercept, visual, IR, GCCS, reach back, etc, etc, etc... You must work hard to correlate multiple sources, to build a picture, a visual representation of the environment around you. You must constantly conduct analyses to determine merchant transit



lanes, trawler hot spots, ocean characteristics like SVP, directional prop loss, propagation paths, Le variability, etc ... , then you must pass this story on to the next watch section. They take what you give them, and build...they validate, refine, and improve the collective knowledge. We must take care to capture the permanent lessons, or knowledge, and pass them on to the collective Force wisdom – to the next deployers. All of that is not easy today and it's not effectively done. I am asking you to develop the equipment, databases, and analysis procedures to dramatically improve this capability – to capture, store and pass on the intrinsic knowledge we create everyday.

Next, my third point - interoperability. We value being connected and collaborative, and an essential element of both these characteristics is achieving interoperability. We can ill afford isolated stand alone systems, which will not directly connect to joint forces at the tactical and operational level. These systems will quite simply drive us out of business.

**They invariably will force us to speak a language not understood by our partners – rendering us irrelevant. Anything new we put on a submarine must be conceived and born joint, and must be open and interoperable.**

**We know how to do this. ARCI is a prime example where we led the way implementing a revolutionary concept in architectural design and capability acquisition. There was an element of risk in taking this approach, but imagine how far back we would be today without ARCI. The inherent open architecture design allowed us to build an interoperable system and maintain it interoperable with scheduled updates. We will continue to entertain new out-of-the-box ideas as long as they are interoperable and improve capability or reduce overall cost.**

**Part of being interoperable is the capability to communicate. You know the challenges we face. I know there is plenty of good work going on to make communications at speed and depth a reality. So much work,**

**I fear we may spread our efforts too thinly in an effort to chase too many technologies. The Undersea FORCEnet working group is the right collaborative mix for attacking this. They have started some excellent work by surveying and assessing the technologies and concepts currently fielded, in prototype, and on the drawing board. In parallel, we are Sea-trialing several potential near term systems. SUBPAC is leading the effort to write the first draft of an overall communications at speed and depth CONOPs. All of these efforts must result in a significant reduction in the time latency of establishing and conducting reliable, two-way communications at data rates sufficient for the problem at hand. Our current focus is ASW. If during a future coordinated ASW engagement, the Theater ASW Commander can, within the span of a few minutes, communicate some concept or action to a CO on a submerged submarine on demand, if they can coordinate contact and targeting data, effect real time waterspace management, and carry out the**

prosecution, then we will have achieved initial success. From there we can build toward higher data rates, greater communications security, more operational flexibility, and more extensive, ubiquitous reach, but the first step is coordinated, littoral, anti-submarine warfare. And we should do it in a build-test-build fashion.

Fourth, expand our area of regard. With the SSGN coming online in the very near future and options being considered for our SSNs, we need to take advantage of the increased payload volume to expand the area of regard of our boats. While operating undetected for long periods in the littorals, we will deploy unmanned vehicles and sensors. Our ears will be open and our reach will be extensive. We will be able to prepare the environment and influence events when directed.

We have been working several years toward universal encapsulation, which will simplify and reduce the cost of employing existing payload from a submarine. We are getting

**much closer to achieving this goal. Just two months ago, we released a Stealthy Affordable Capsule from a Flexible Payload Module onboard USS GEORGIA. From initial indications, this launch was a success and clears the way for the next step, which is to launch an actual payload. Right now, the Submarine Littoral Warfare Weapon is poised to be first out of the chute. Working through this new payload will not only give us an area dominance weapon, it will also facilitate an offensive capability to support SOF and other littoral combat options. Working this capability will enable us to resolve many of the general technical issues of submerged payloads. We will leverage this effort to field UAVs, UUVs, IO, and weapons for time critical strike. The Submarine will be an enhanced node in the net, providing a viable, responsive option for wide area clandestine surveillance, battlespace shaping, and target servicing.**

**Lastly, the Cost of technology insertion. New capability, which reduces our overall costs, must be embraced. We pay**

CDR Jim Gray

**Comment:** Make sure this is true

**a significant amount in terms of time, dollars, and training to enhance the capability of our boats. Driving down these costs will not only free up more dollars to buy additional capability, but will enable higher operational availability and will more efficiently utilize our people's time. One dollar today in order to save two dollars tomorrow could also be a wise investment. Cost reductions in technology insertion, maintenance, training, and manpower can add to significant amounts, which can more than offset initial procurement costs. To make smart decisions, we will need a rock solid business case. You should find Navy leadership today has a better appreciation for business principles and eager to pursue this approach.**

**Let me give you an example. The COATS facility at EB required a large initial investment. However, the savings we have achieved in terms of reduced ship building cost, reduced time to install and integrate combat systems, and more rapid crew training has produced a sizable return on**

**investment. Ring laser gyro in place of more fragile inertial navigators is another.**

**An initiative we have taken at the operational level has reduced people and effort while piloting in restricted waters. This is an area where we throw too many people at what should be a relatively simple problem. Commercial mariners accomplish this task with 5 people and we use 19. After conducting an experiment on USS OKLAHOMA CITY and USS KEY WEST we learned how to reduce the number of people to 14, while still using current technology. It's working. We have invested in electronic navigation and charting system and when they are fully implemented and certified, we should be able to reduce this to 9 and we should go further. The net result will be a savings to the Submarine Force and Navy.**

**There are other opportunities out there to reduce manning requirements through technology insertion. I don't have all the answers, but will offer one area to investigate: force protection. Since 9/11, we have continued to grow the**

**requirements and every new requirement means more people.**

**It is up to us to scrub the requirements for validity, but technology could also help by automating some of the functions currently performed by humans.**

**I have given you quite a bit today, but I really do believe I'm not asking too much from you. Just deliver people, process, and equipment in a way to improve our systems so they present a clear picture of reality to the decision makers in an actionable format at the time they need it. Automate collection of information and enable analysis required to distill trends which will enable continuity and learning at both the tactical and strategic levels. Make all future systems interoperable, even with systems which do not exist yet. In the near term, get our submarines connected to the larger battle-force with emphasis on reducing latency of command. Bring universal encapsulation to fruition so we can put new payload on our submarines without breaking the bank. And, taking into account total life-cycle costs, bring new capability,**



or even replace current capability, with designs that cost less to equip, maintain, and operate. There is nothing earth-shattering about this, it is the list we need to work together on a priority basis. And if there is any doubt out there that these things can be done – just look at the capability today in USS VIRGINIA and her modern, all volunteer crew in comparison to our early nuclear subs. The distance we have come is much further than what I am asking you to do.

I realize your membership in SUBTECH is not your primary duty, but you serve a very important function in developing and shaping the future of undersea capability. Like ADM Nimitz in 1942, we face significant challenges in meeting our commitments to the Navy and our Nation - I am confident we too, will find the way to ensure our Naval forces are as well equipped as we can make them; as well trained as current unpredictable circumstances demand; and as capable of defeating every foe as our nation expects. If we can keep the engine of Undersea Enterprise in tune and firing in a

**synchronized manner, we will be successful in delivering the capability this nation needs. We will deliver undersea superiority to every portion of the globe. Thank you for your attention and keep charging.**